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CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 18 August 2003 with an application for Letters Patent number 527651 made by CANTERPRISE LIMITED.

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Dated 1 September 2004.

PRIORITY DOCUMENT
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Neville Harris
Commissioner of Patents, Trade Marks and Designs



527651

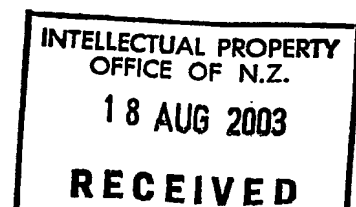
NEW ZEALAND
PATENTS ACT, 1953

PROVISIONAL SPECIFICATION

A POWERED UNICYCLE

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We, CANTERPRISE LIMITED, a New Zealand company of Forestry School Building, Forestry Road, Ilam, Christchurch, New Zealand, do hereby declare this invention to be described in the following statement:



FIELD OF INVENTION

This invention relates to modifications to the unicycle that upgrade it to what is potentially a useful powered transport vehicle.

BACKGROUND

Riders of unicycles maintain their stability by managing their balance both laterally and fore and aft.

Lateral balance on a unicycle is achieved in the same way as it is with a bicycle or scooter. For straight line riding, this is done by steering the moving vehicle so that the wheels are directly below the center of mass. And in turning lateral balance is achieved by steering the vehicle so that a fall is initiated in the direction of the desired turn, and then the resulting lean is again controlled by steering, so that the centripetal force is balanced by the offset of the center of mass from the point of contact on the ground. Figure 1.

Fore-and-aft balance on a unicycle is managed by speeding the wheel up or slowing the wheel down to keep the wheel point-of-contact under the center of mass. During acceleration or deceleration the wheel point-of-contact is positioned behind or ahead of the center of mass respectively, again so that the offset is balanced by the accelerating or decelerating forces. Figure 2

SUMMARY OF INVENTION

In broad terms the invention comprises a powered unicycle including a wheel, a motor, and a balance system arranged to monitor fore-and-aft balance in use.

In one form the unicycle is scooter-like and includes a platform or footlegs on which a rider may stand and an upright handlebar.

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In another form the unicycle includes a seat on which a rider may sit when riding the unicycle.

If a unicycle is to be successfully powered, either the rider or an automated system must perform the two functions of lateral and fore-and-aft balance.

Because most people can ride a bicycle or a scooter they are quite familiar with the skill of maintaining lateral balance. Far fewer people are able to ride a unicycle and have the skill to maintain fore-and-aft balance.

For full stability this vehicle then requires the lateral balance to be managed by the rider. But since the lateral balance is a common bike-riding skill, the vehicle should be manageable by anyone who can ride a bike.

Preferred forms of the invention:

1. provide a novel, compact, powered, balancing vehicle with the very minimum of control input;
2. provide a steering connection which allows intuitive steering for those with bike-riding skills; and
3. provide a unicycle which handles like a scooter in that it has a standing platform and handlebar steering.

POSSIBLE EMBODIMENTS OF THE INVENTION

The vehicle in one preferred form is shown in Figure 3. In one form the vehicle is electric.

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The platform is pivotally connected to the pillar possibly with a resilient or sprung connection, so that the rider on the platform can steer the pillar and wheel to maintain lateral balance.

The top of the pillar incorporates handlebars that allow the rider to steer. A motor drives the single wheel.

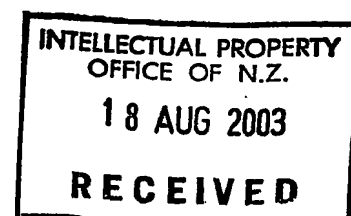
A control system is housed within the vehicle. The system simply detects whether the pillar (or some suitable datum line) is in line with the local gravitational and inertial force field. If the wheel is behind the field, the control system accelerates the wheel to catch up. If the wheel is ahead the control system slows the wheel to allow the rider and vehicle mass to catch up with the wheel. In this way fore and aft balance is maintained.

To accelerate the vehicle from rest the rider mounts as one would a scooter, with a push-off. The control system takes over, accelerating or decelerating to maintain fore-and-aft balance. The rider, at the same time, steers to left or right to maintain lateral balance. Should the rider want to go faster they need only to lean (the pillar) forward. Should they want to slow down they simply lean the pillar back.

The vehicle preferably has a low speed limit below which the motor is switched off. This ensures the vehicle is at least at operating speed before it is required to maintain balance.

The foregoing describes the invention including a preferred thereof so alterations and modifications as will be obvious to those skilled in the art are intended to be incorporated within the scope hereof as defined in the accompanying claims.

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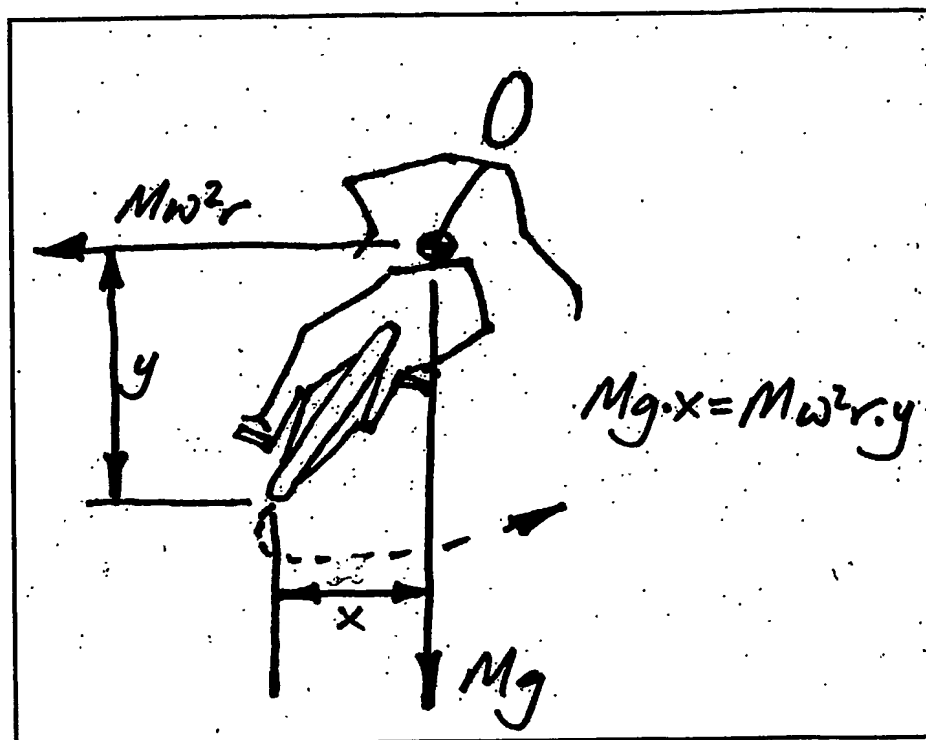


Figure1: Lateral balance on a cornering bicycle, scooter or unicycle

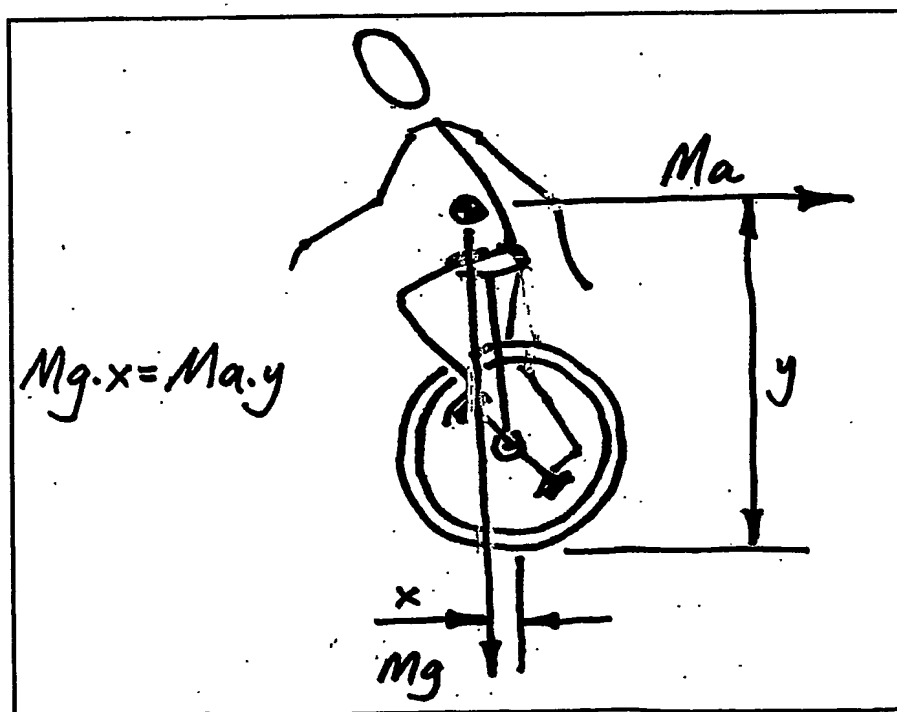
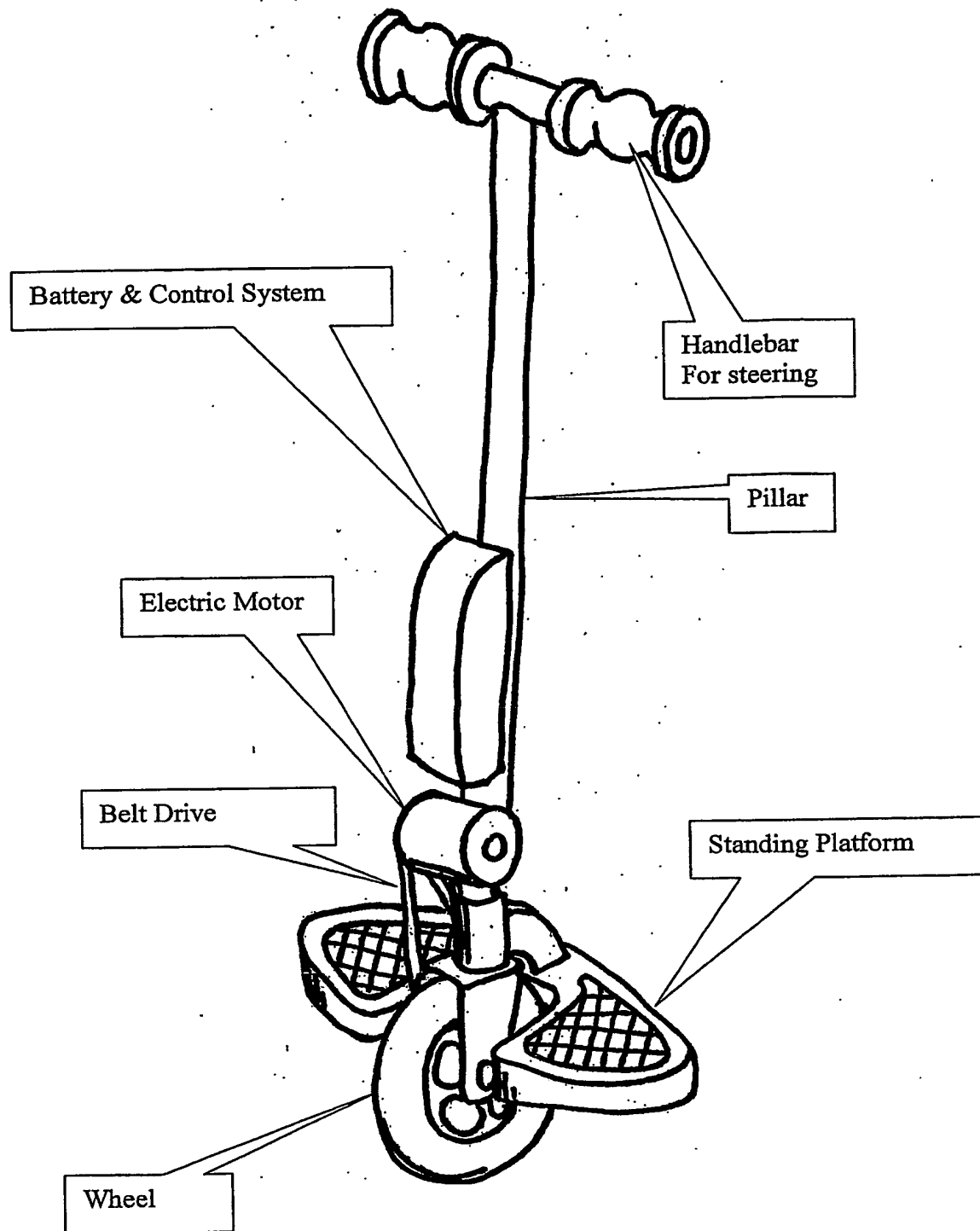


Figure 2: Fore-and-aft balance on an accelerating unicycle

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Figure 3: The Whole Vehicle in one form.